Wind tunnel AER stats

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Get wind tunnel data only.

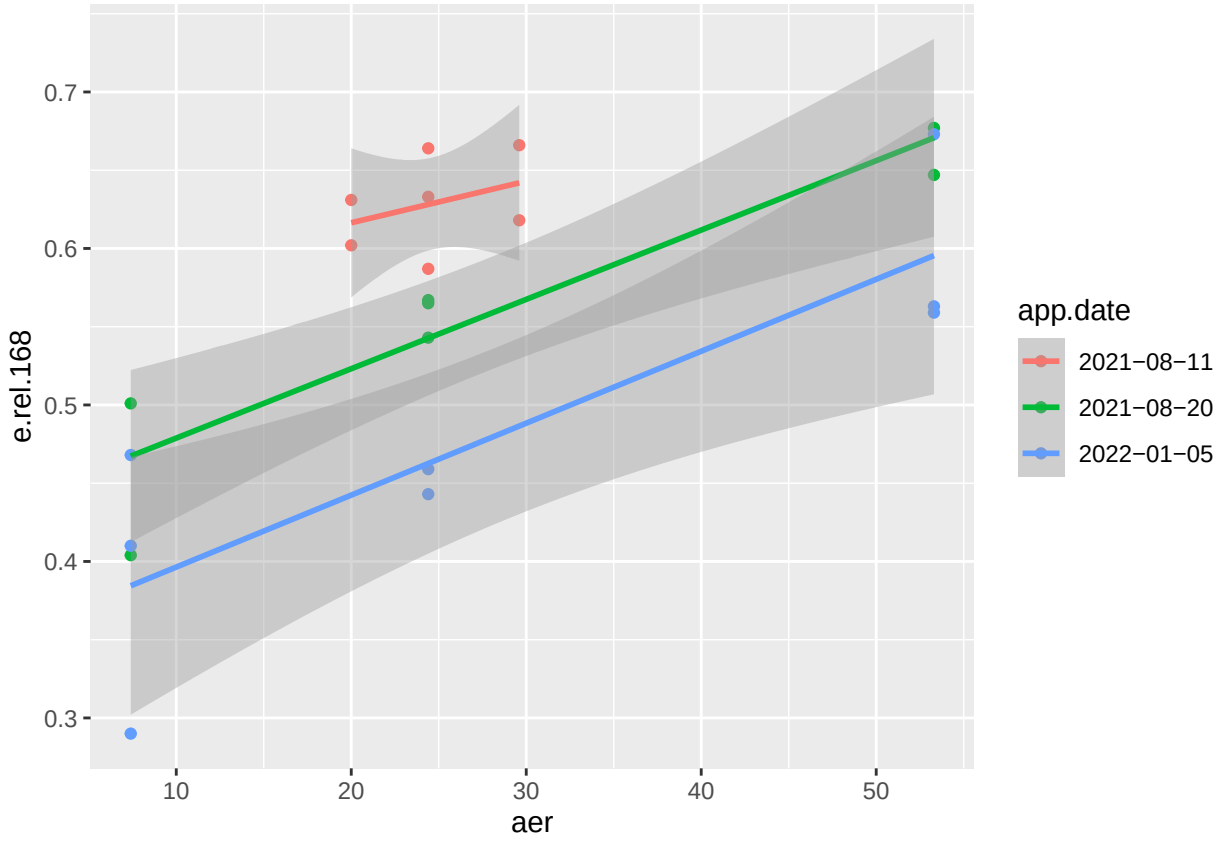
```
wsumm <- subset(isumm, meas.tech == 'Wind tunnel')
dfsumm(as.data.frame(wsumm))
```

```
##
##  22 rows and 23 columns
##  22 unique rows
##                      trial.nm   app.date    pmid   meas.tech meas.tech2
## Class                character  character integer   character  character
## Minimum               A 11 Aug 2021-08-11    1904 Wind tunnel         wt
## Maximum               C 05 Jan 2022-01-05    1925 Wind tunnel         wt
## Mean                      <NA>       <NA>    <NA>        <NA>       <NA>
## Unique (excld. NA)           3          3      22           1          1
## Missing values               0          0       0           0          0
## Sorted                    TRUE       TRUE    TRUE        TRUE       TRUE
##
##                         aer       aer.grp     cta air.temp.mean air.temp.min
## Class               numeric        factor numeric       numeric      numeric
## Minimum                 7.4   Low 7 or 20     181          2.46         -3.4
## Maximum                53.3 High 30 or 54     211          15.4         11.4
## Mean                   27.2     Medium 25     193          10.5         4.93
## Unique (excld. NA)        5             3       3             6            6
## Missing values            0             0       0             0            0
## Sorted                FALSE         FALSE   FALSE         FALSE        FALSE
##
##                     air.temp.max wind.2m.mean wind.2m.min wind.2m.max rain.cum
## Class                    numeric      numeric     numeric     numeric  numeric
## Minimum                      8.5          0.1         0.1         0.1        0
## Maximum                     22.3         0.72        0.72        0.72        0
## Mean                        17.1        0.367       0.367       0.367        0
## Unique (excld. NA)             6            5           5           5        1
## Missing values                 0            0           0           0        0
## Sorted                     FALSE        FALSE       FALSE       FALSE     TRUE
##
##                     rain.cum.48 j.NH3.mean j.NH3.min j.NH3.max e.cum.final
## Class                   numeric    numeric   numeric   numeric     numeric
## Minimum                       0     0.0928         0     0.524        19.6
## Maximum                       0      0.264    0.0375      4.31        47.7
## Mean                          0      0.198   0.00741      2.67        37.8
## Unique (excld. NA)            1         21        12        22          22
## Missing values                0          0         0         0           0
## Sorted                     TRUE      FALSE     FALSE     FALSE       FALSE
```

```
##
##                     e.rel.final e.cum.168 e.rel.168
## Class                   numeric   numeric   numeric
## Minimum                   0.317      17.9      0.29
## Maximum                   0.711      47.4     0.677
## Mean                      0.568      36.9     0.553
## Unique (excld. NA)           21        20        22
## Missing values                0         0         0
## Sorted                    FALSE     FALSE     FALSE
##
```

```
ggplot(wsumm, aes(aer, e.rel.168, colour = app.date)) +
  geom_point() + geom_smooth(method = lm)
```

```
## `geom_smooth()` using formula 'y ~ x'
```




```
m1 <- lm(e.rel.168 ~ aer + factor(app.date), data = wsumm)
summary(m1)
```

```
##
## Call:
## lm(formula = e.rel.168 ~ aer + factor(app.date), data = wsumm)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.096571 -0.028905  0.002575  0.023349  0.081429
##
## Coefficients:
```

```
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 0.5179174  0.0228705  22.646 1.12e-14 ***
## aer                         0.0044987  0.0006138   7.330 8.33e-07 ***
## factor(app.date)2021-08-20 -0.0852673  0.0243495  -3.502  0.00255 **
## factor(app.date)2022-01-05 -0.1646365  0.0236440  -6.963 1.67e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.04541 on 18 degrees of freedom
## Multiple R-squared:  0.8367, Adjusted R-squared:  0.8094
## F-statistic: 30.73 on 3 and 18 DF,  p-value: 2.693e-07
```

```
anova(m1)
```

```
## Analysis of Variance Table
##
## Response: e.rel.168
##                  Df   Sum Sq  Mean Sq F value    Pr(>F)
## aer               1 0.090101 0.090101  43.699 3.308e-06 ***
## factor(app.date)  2 0.100012 0.050006  24.253 7.794e-06 ***
## Residuals        18 0.037114 0.002062
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
confint(m1)
```

```
##                                 2.5 %       97.5 %
## (Intercept)                 0.469868343  0.565966479
## aer                         0.003209222  0.005788204
## factor(app.date)2021-08-20 -0.136423659 -0.034111035
## factor(app.date)2022-01-05 -0.214310816 -0.114962215
```

```
drop1(m1, test = 'F')
```

```
## Single term deletions
##
## Model:
## e.rel.168 ~ aer + factor(app.date)
##                  Df Sum of Sq      RSS     AIC F value    Pr(>F)
## <none>                        0.037114 -132.47
## aer               1   0.11077 0.147884 -104.05  53.723 8.328e-07 ***
## factor(app.date)  2   0.10001 0.137126 -107.71  24.253 7.794e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
m2 <- lm(e.rel.168 ~ aer * factor(app.date), data = wsumm)
summary(m2)
```

```
##
## Call:
## lm(formula = e.rel.168 ~ aer * factor(app.date), data = wsumm)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.094460 -0.023873  0.002623  0.024283  0.083540
##
## Coefficients:
```

```
##                                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)                      0.563260   0.124115   4.538 0.000336 ***
## aer                              0.002658   0.004985   0.533 0.601309
## factor(app.date)2021-08-20      -0.128738   0.128654  -1.001 0.331889
## factor(app.date)2022-01-05      -0.212819   0.127622  -1.668 0.114850
## aer:factor(app.date)2021-08-20  0.001774   0.005091   0.348 0.732062
## aer:factor(app.date)2022-01-05  0.001939   0.005057   0.384 0.706366
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.04793 on 16 degrees of freedom
## Multiple R-squared:  0.8382, Adjusted R-squared:  0.7877
## F-statistic: 16.58 on 5 and 16 DF,  p-value: 7.859e-06
```

```
anova(m2)
```

```
## Analysis of Variance Table
##
## Response: e.rel.168
##                      Df   Sum Sq  Mean Sq F value    Pr(>F)
## aer                   1 0.090101 0.090101 39.2176 1.133e-05 ***
## factor(app.date)      2 0.100012 0.050006 21.7658 2.723e-05 ***
## aer:factor(app.date)  2 0.000354 0.000177  0.0771    0.9261
## Residuals            16 0.036760 0.002297
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
confint(m2)
```

```
##                                      2.5 %     97.5 %
## (Intercept)                      0.300148471 0.82637230
## aer                             -0.007911136 0.01322642
## factor(app.date)2021-08-20      -0.401473027 0.14399651
## factor(app.date)2022-01-05      -0.483365141 0.05772695
## aer:factor(app.date)2021-08-20 -0.009018049 0.01256551
## aer:factor(app.date)2022-01-05 -0.008780254 0.01265917
```

```
drop1(m2, test = 'F')
```

```
## Single term deletions
##
## Model:
## e.rel.168 ~ aer * factor(app.date)
##                      Df  Sum of Sq      RSS     AIC F value Pr(>F)
## <none>                               0.036760 -128.68
## aer:factor(app.date)  2 0.00035424 0.037114 -132.47  0.0771 0.9261
```